



HELIX MOBILE SERVER FILE FORMAT AND CODEC SUPPORT

Helix Mobile Server Version 11.1

Revision Date: 5 October 2007

RealNetworks, Inc.
PO Box 91123
Seattle, WA 98111-9223
U.S.A.

<http://www.real.com>
<http://www.realnetworks.com>

©2007 RealNetworks, Inc. All rights reserved.

Information in this document is subject to change without notice. No part of this document may be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose, without the express written permission of RealNetworks, Inc.

Printed in the United States of America.

Helix, the Helix Logo, Real, the Real "bubble" (logo), RealJukebox, RealOne, Real-rTV, RealArcade, RealAudio, RealDownload, RealNetworks, RealPix, RealPlayer, RealPresenter, RealProducer, RealProducer Plus, RealPoducer Pro, RealProxy, RealPublisher, RealSites, RealSystem, RealText, RealVideo, Rhapsody, SureStream, The Future is Real, TurboPlay, and Xing are trademarks or registered trademarks of RealNetworks, Inc.

Other product and corporate names may be trademarks or registered trademarks of their respective companies.

CONTENTS

HELIX MOBILE SERVER CODEC SUPPORT.....	7
1. UNDERSTANDING FILE FORMATS AND CODECS.....	1
1.1. File Formats.....	1
1.2. Hint Track.....	2
1.3. Codecs.....	2
2. PROPRIETARY CODECS.....	3
2.1. RealAudio and RealVideo.....	4
2.2. Windows Media.....	5
2.3. QuickTime Proprietary Codecs.....	5
3. STANDARDS-BASED CODECS.....	5
3.1. AAC.....	7
3.2. AMR.....	7
3.3. H.263.....	7
3.4. H.264.....	8
3.5. MP3.....	8
3.6. MPEG-4 Simple Video Profile.....	9
4. HELIX MOBILE PRODUCER FILE FORMAT AND CODEC SUMMARY.....	9
4.1. File Formats Used with Audio Codecs.....	9
4.2. File Formats Used with Video Codecs.....	10
5. UNCOMPRESSED AND OLDER FORMATS.....	10

HELIX MOBILE SERVER CODEC SUPPORT

This technical brief explains the file formats and codecs that Helix Mobile Server can stream. It also explains the formats and codecs used by Helix Mobile Producer to encode content for mobile devices.

1. Understanding File Formats and Codecs

To understand the types of media that Helix Mobile Server can stream, you need to understand various components such as the *file format*, *hint track*, and *codec*. The following sections provide an overview of these components.

1.1. File Formats

Media formats are commonly named according to file formats, such as RealMedia, Windows Media, QuickTime, and MPEG-4. The file format specifies how information is packaged within the clip. For example, each media clip contains numerous informational fields in addition to the audio or video data. These fields provide the media player with the clip title, playing time, and so on. The file format specifies what information the clip may contain, and where within the file the information fields and media data are stored.

To stream a media clip, Helix Mobile Server must be able to read the file format to pull out necessary information and media data packets. It generally has a separate file format plug-in that it uses to read each file type. If it does not possess the appropriate plug-in for a certain file format, Helix Mobile Server cannot stream the file. Although a file format plug-in enables Helix Mobile Server to open and read a file of a certain type, it typically does not enable the server to decode the audio and video data, which is the job of a codec on a media player.

The following table lists common file formats used for audio and video. A **Yes** value indicates that Helix Mobile Server can read this file format using one of its standard file format plug-ins. Keep in mind that this table is a guide to *file format* support, not *codec* support. For example, although Helix Mobile Server does not stream the raw AAC file format (.aac), it can deliver content encoded with AAC codecs into other file formats, such as MPEG-4 (.mp4). Subsequent sections explain codec support for the various file formats.

Common Streaming Media File Formats Supported by Helix Mobile Server

File Format	Common File Extensions	Supported?
3GPP Release 5 or 6	.3gp	Yes
3GPP2	.3g2	Yes

(Table Page 1 of 2)

Common Streaming Media File Formats Supported by Helix Mobile Server (continued)

File Format	Common File Extensions	Supported?
AIFF	.aiff	Yes
AU	.au	Yes
AVI	.avi	Yes
MP3	.mp3	Yes
MPEG-1	.mpg	No
MPEG-2	.m2p, .m2v, .mpv	No
MPEG-4	.mp4	Yes
Qualcomm QCELP	.qcp	No
QuickTime	.mov	Yes
Raw AAC	.aac	No
Raw AMR	.amr	No
RealMedia	.rm, .ra, .rv, .rmvb	Yes
WAV	.wav	Yes
Windows Media	.asf, .wma, .wmv	Limited (Support for desktop players only. See “Windows Media” on page 5.)

(Table Page 2 of 2)

1.2. Hint Track

Many streaming media formats, including QuickTime and MPEG-4, contain a hint track that provides Helix Mobile Server with information about how to stream the clip’s media packets. Although you can typically encode these clips without a hint track, doing so is recommended only for downloaded media rather than streamed media. If the format can include a hint track, add the track when encoding the clip to ensure that the clip streams well.

Helix Mobile Server generally can stream MPEG-4 or 3GPP clips encoded with any codec, as long as the clips include a hint track. In addition, Helix Mobile Server can stream clips encoded with certain codecs whether or not the clips contain hint tracks. The following are the MPEG-4 and 3GPP audio and video codecs that do not need to include hint tracks. For these codecs, Helix Mobile Server refers to the hint track if it is present, but still streams the media packets if the track is absent:

- H.263 profile 0 and profile 3
- MPEG-4 Part 2 simple video
- AAC low complexity
- AMR-NB (narrowband) and AMR-WB (wideband)

1.3. Codecs

Every streaming media clip is produced using a codec, which is shorthand for *coder/decoder*. The encoding software used to create the streaming clip employs a

codec to compress the media data. On the receiving end, the media player uses the same codec to decode the media data and play the clip. If the media player does not have the correct codec, it cannot play the clip.

Helix Mobile Server does not need a codec to stream a file. As long as the server can read the file format, it can create streaming packets. It is the job of the media player, therefore, to decode those packets. For this reason, Helix Mobile Server can generally stream any clip in a supported file format.

To illustrate these points, consider QuickTime, which is a file format that uses the file extension `.mov`. A popular codec for encoding QuickTime clips is the proprietary Sorenson codec. However, QuickTime clips can also be encoded using a number of different codecs. A QuickTime clip can be encoded using an MP3 or H.264 codec, for example.

Because Helix Mobile Server can read the QuickTime file format, it can stream any QuickTime clip to a QuickTime-enabled player regardless of the codec used to encode the audio and video data. Whether the media player can play it, however, depends on whether the player supports both the QuickTime file format and the codec used to encode the audio and video data.

For instance, QuickTime Player reads the QuickTime format and includes the Sorenson codec. In contrast, RealPlayer can read the QuickTime format, but does not include the Sorenson codec. It can therefore play a QuickTime clip only if the clip is encoded with a standards-based codec such as MP3.

2. Proprietary Codecs

The following table summarizes the popular proprietary file formats that Helix Mobile Server can stream without the addition of third-party file format plug-ins.

Proprietary and Common Formats			
Format	File Container	Use	Notes
Flash	Shockwave Flash version 4 (.swf)	animation	Support for Flash version 4 only. Later versions of Flash and Flash video are not supported.
QuickTime	QuickTime (.mov)	audio and video	Support for proprietary codecs such as Sorenson, Cinepak, Qualcomm PureVoice, and Qdesign, as well as standards-based codecs such as MP3, H.263, and H.264.
RealMedia	RealAudio (.rm, .ra) RealVideo (.rm, .rmvb)	audio and video	RealMedia formats are compatible with RealPlayer and media players based on Helix DNA. Clips can be single rate, or encode multiple rates using SureStream.

(Table Page 1 of 2)

Proprietary and Common Formats (continued)

Format	File Container	Use	Notes
RealPix GIF JPEG PNG	RealPix (.rp) GIF (.gif) JPEG (.jpeg or .jpg) PNG (.png)	still images	Still images in the three common Web formats can be streamed from within a RealPix slideshow.
RealText	RealText (.rt)	text	RealText provides a mark-up language to stream text to RealPlayer.
Secure RealMedia	Secure RealMedia (.rms)	audio and video	Secure RealMedia can encode a variety of media formats in a secure container accessible using Helix DRM.
SMIL	SMIL (.smil)	multimedia presentations	SMIL is a standards-based mark-up language for synchronizing media presentations. It is available for use with desktop versions of RealPlayer.
Windows Media	Advanced Streaming Format (.asf) Windows Media Audio (.wma) Windows Media Video (.wmv)	audio and video	Streaming to desktop players only. Mobile devices not supported. MMS support for desktop Windows Media Player versions 6.4 through 10. HTTP support for versions 11 and later. MBR version 9 is not supported.

(Table Page 2 of 2)

2.1. RealAudio and RealVideo

Helix Mobile Server can stream RealAudio and RealVideo to RealPlayer, as well as to Helix DNA-based media players that include support for the RealMedia formats. You can encode RealAudio or RealVideo using RealProducer or Helix Mobile Producer.

2.1.1. Secure RealMedia

Secure RealMedia is a proprietary file format that uses the file extension .rms. Using the Helix DRM Packager, you can package as secure RealMedia an unsecure clip encoded by a variety of codecs, such as RealAudio, RealVideo, MP3, H.263, H.264, MPEG-4, AAC, or AMR. The secure clip includes a globally unique identifier (GUID), as well as a key for the secured file.

2.1.2. RealPix

Using RealPix, you can stream slideshows composed of still images in GIF, JPEG, or PNG formats. The RealPix markup language includes special effects, letting you fade between images, for example, or zoom in on an image detail. You can also use SMIL to coordinate your slideshow with a streaming soundtrack.

2.1.3. RealText

With RealText, you can create timed text clips that can stream alone or in combination with other media such as audio or video. This makes RealText a handy means for adding text to SMIL presentations. Using RealText, you can add subtitles to a video, for example, or provide closed-captioning.

2.1.4. SMIL

You can use Synchronized Multimedia Integration Language (SMIL) to coordinate multiple clips into a single presentation for streaming to RealPlayer or other SMIL-compatible players. A SMIL file, which has the file extension .smil, uses XML-based markup to lay out and time any number of clips played together or in sequence.

2.2. Windows Media

Helix Mobile Server can deliver live and on-demand audio and video streams in the Microsoft Windows Media format to desktop players only. Streaming of Windows Media to mobile devices (cellular telephones or wireless, handheld devices) is **not** supported. Note the following about streaming to desktop players:

- For versions 6.4 through 10 of the desktop Windows Media Player, Helix Mobile Server uses the MMS protocol. It delivers streams to Windows Media Player versions 11 and higher using HTTP. RTSP delivery to Windows Media Player versions 11 and higher is **not** supported.
- Helix Mobile Server supports multiple bit rate (MBR) encoding of on-demand clips and live streams for Windows Media version 7 only. It does **not** provide streaming capability for MBR clips encoded as Windows Media version 9 and later.

2.3. QuickTime Proprietary Codecs

Helix Mobile Server can stream to Apple's QuickTime Player hinted QuickTime clips encoded with the major proprietary codecs, such as Sorenson, Cinepak, Qualcomm PureVoice, and Qdesign. Helix Mobile Server can stream live QuickTime broadcasts from Sorenson Broadcaster, as well as simulated broadcasts from Playlist Broadcaster and the Helix Mobile Server SLTA utility. The QuickTime format can also be used as the container for a number of standards-based codecs, such as MP3 and H.264.

3. Standards-Based Codecs

Helix Mobile Server can deliver content encoded by standards-based codecs into a variety of file formats, including MPEG-4, 3GPP, 3GPP2, and QuickTime. (MPEG-

1 and MPEG-2 are **not** supported.) The following table summarizes commonly used codecs that Helix Mobile Server supports.

Standards-Based Codecs

Format	File Container	Use	Notes
AAC	MPEG-4 (.mp4), 3GPP (.3gp), 3GPP2 (.3g2), QuickTime (.mov). The raw AAC format (.aac) is not supported.	voice, music	Also known as MPEG-4 AAC. Low-complexity (LC) encoding in mono or stereo at 8 to 320 Kbps. Hinting is not required.
AAC Plus (HE-AAC)	MPEG-4 (.mp4), 3GPP (.3gp), 3GPP2 (.3g2), QuickTime (.mov). The raw AAC format (.aac) is not supported.	voice, music	Encodes at various bit rates. Hinting is required.
Enhanced AAC Plus (HE-AAC, version 2)	MPEG-4 (.mp4), 3GPP (.3gp), 3GPP2 (.3g2), QuickTime (.mov). The raw AAC format (.aac) is not supported.	voice, music	Encodes at various bit rates. Hinting is required.
AMR-NB AMR-WB	MPEG-4 (.mp4), 3GPP (.3gp), 3GPP2 (.3g2), QuickTime (.mov). The raw AMR format (.amr) is not supported.	voice	Narrowband codec (AMR-NB) encodes at 7.4 to 12.2 Kbps. The AMR-WB codec, also known as G722.2, encodes up to 23.85 Kbps. Hinting is not required.
DV14	QuickTime (.mov)	wideband	
G.711	QuickTime (.mov)	voice	Encodes at 64 Kbps.
G.722	QuickTime (.mov)	voice	Encodes at 32 to 64 Kbps.
G.726	QuickTime (.mov)	voice	Encodes at 16 to 40 Kbps.
H.261	QuickTime (.mov)	video	Encodes at multiples of 64 Kbps.
H.263	MPEG-4 (.mp4), 3GPP (.3gp), 3GPP2 (.3g2), QuickTime (.mov)	video	Hinting not required for profiles 0 and 3.
H.264	MPEG-4 (.mp4), 3GPP (.3gp), 3GPP2 (.3g2), QuickTime (.mov)	video	Also known as MPEG-4 AVC or MPEG-4 Part 10. Hinting is required. Maximum supported streaming speed is 384 Kbps.
H.723.1	QuickTime (.mov)	voice	Encodes at 5.3 or 6.3 Kbps.
MP3	MP3 (.mp3), QuickTime (.mov)	voice, music	Streaming of .mp3 files is supported only for RealPlayer and Helix-based players.
MPEG-4, Part 2	MPEG-4 (.mp4), 3GPP (.3gp), 3GPP2 (.3g2), QuickTime (.mov)	video	Simple video profile encoded using the ISO/IEC video codec. The advanced simple profile is supported only with hinted content.
QCELP	3GPP2 (.3g2). The QCELP format (.qcp) is not supported.	speech	Encodes at 14 Kbps (full-rate) or 6.8 Kbps (half-rate). Must be hinted.

3.1. AAC

Advanced Audio Coding (AAC) codecs encode mixed-audio content at bit rates from 8 to 128 Kbps, providing better quality than MP3 at the same bit rate. AAC audio can be used along with H.264 video to provide high-quality, standards-based clips. Helix Mobile Server can stream AAC content from MPEG-4, 3GPP, 3GPP2, and QuickTime files. The raw AAC file format (.aac) is **not** supported.

3.1.1. AAC Content Encoded by Helix Mobile Producer

When you encode audio content using Helix Mobile Producer, you can select one of three types of AAC:

- AAC-LC (low-complexity) – Helix Mobile Producer encodes AAC Plus and Enhanced AAC Plus in the 3GPP Release 5 or 6 format (.3gp), and as well as the MPEG-4 (ISMA profile 0) format. Hinting is **not** required to stream low-complexity AAC.
- AAC Plus – Also known as High Efficiency AAC (HE-AAC). This version includes the features of AAC-LC along with Spectral Band Replication (SBR). Helix Mobile Producer encodes AAC Plus only in the 3GPP Release 6 file format (.3gp). Hinting is required.
- Enhanced AAC Plus – Also known as High Efficiency AAC, version 2 (HE-AAC v2). Enhanced AAC Plus includes the features of AAC Plus along with the MPEG-4 parametric stereo option. Helix Mobile Producer encodes Enhanced AAC Plus only in the 3GPP Release 6 file format (.3gp). Hinting is required.

3.2. AMR

The Adaptive Multirate speech codec (AMR) encodes voice data at a variety of speeds. Helix Mobile Server can stream AMR content from MPEG-4, 3GPP, 3GPP2, and QuickTime files. It does **not** support the AMR file format (.amr), however. Although hinting is recommended, AMR clips do not require hinting to stream.

3.2.1. AMR Content Encoded by Helix Mobile Producer

Using Helix Mobile Producer, you can encode narrowband AMR voice clips at bit rates ranging from 7.4 Kbps to 12.2 Kbps. Wideband AMR clips can be encoded from 6.6 Kbps to 23.85 Kbps. For use with Helix Mobile Server, Helix Mobile Producer encodes AMR in the 3GPP Release 5 or Release 6 format.

3.3. H.263

Helix Mobile Server supports the streaming of all profiles and levels of encoded H.263 content. It can read this content from an MPEG-4, 3GPP, 3GPP2, or QuickTime file. H.263 profiles 0 and 3 do not require hinting, though hinting is recommended. All other profiles require hint tracks.

3.3.1. H.263 Content Encoded by Helix Mobile Producer

Helix Mobile Producer encodes H.263 content using the International Telecommunications Union video codec. Supported file formats are 3GPP Release 5 or Release 6, with bit rates ranging from 10 to 384 Kbps. Profile 0 (baseline) is the only supported profile. When encoding, you can choose level 10, 20, or 30.

H.263 Profile 0 Levels Encoded by Helix Mobile Producer

Level	Video Resolutions	Maximum Frame Rate	Maximum Bit Rate
10	128 × 96 (SQCIF) 176 × 144 (QCIF)	15	64 Kbps
20	128 × 96 (SQCIF) 176 × 144 (QCIF) 352 × 288 (CIF)	30	128 Kbps
30	128 × 96 (SQCIF) 176 × 144 (QCIF) 352 × 288 (CIF)	30	384 Kbps

3.4. H.264

Helix Mobile Server streams all profiles and levels of encoded H.264 content, also known as MPEG-4 Part 10, or MPEG-4 AVC. It can read this content from an MPEG-4, 3GPP, 3GPP2, or QuickTime file. All H.264 content must contain hint tracks. The streaming speed for all H.264 content is limited to 384 Kbps.

3.4.1. H.264 Content Encoded by Helix Mobile Producer

Helix Mobile Producer encodes H.264 using the MPEG-4 AVC International Telecommunications Union video codec. It encodes content for mobile devices using the H.264 baseline profile (BP) only. The file format is 3GPP Release 6. When encoding content, you can choose one of the following levels:

- level 1 up to 64 Kbps
- level 1b up to 128 Kbps
- level 1.2 up to 384 Kbps
- level 1.3 up to 384 Kbps (half of the 768 Kbps maximum for this level)

3.5. MP3

Helix Mobile Server uses a proprietary stream packetization method when streaming the MP3 file format (.mp3). This makes the stream compatible only with RealPlayer and media players based on Helix DNA. However, Helix Mobile Server can stream hinted, MP3-encoded content from file formats such as QuickTime and MPEG-4. For example, if you encode hinted, MP3 content in a QuickTime (.mov) file, the stream is compatible with any streaming MP3 player that can read the QuickTime format. This includes RealPlayer and QuickTime Player.

3.6. MPEG-4 Simple Video Profile

Helix Mobile Server streams MPEG-4 part 2 compressed video encoded in the MPEG-4, 3GPP, 3GPP2, or QuickTime format. It can deliver hinted or unhinted content encoded in the simple profile. Content encoded using the advanced simple profile must be hinted to stream.

3.6.1. MPEG-4 Part 2 Content Encoded by Helix Mobile Producer

Helix Mobile Producer can encode an MPEG-4 simple profile video as a 3GPP Release 5 or 6 file, 3GPP2 file, or an MPEG-4 (ISMA Profile 0) file. You can choose one of the following levels:

- level 0 up to 64 Kbps
- level 0b up to 128 Kbps
- level 1 up to 64 Kbps
- level 2 up to 128 Kbps
- level 3 up to 384 Kbps

4. Helix Mobile Producer File Format and Codec Summary

Helix Mobile Producer encodes RealMedia and standards-based clips for mobile audiences. Note, however, that Helix Mobile Server can stream a larger set of datatypes than Helix Mobile Producer can encode. As well, Helix Mobile Producer can encode some file formats, such as .amr, that Helix Mobile Server does not stream. The following tables summarize the codecs and file formats that you can encode with Helix Mobile Producer and stream with Helix Mobile Server.

4.1. File Formats Used with Audio Codecs

The following table summarizes the file formats that Helix Mobile Producer can use for the various audio codecs it supports. The file formats that Helix Mobile Server does not stream, such as .amr, have been omitted.

Audio Codec Compatibility with Supported File Formats

File Format	AAC		Enhanced AAC Plus		AMR-NB	AMR-WB	QCELP	MP3	Real-Audio
	AAC	AAC Plus	AAC Plus	AMR-NB	AMR-WB	QCELP	MP3	Real-Audio	
3GPP Version 5	X			X	X				
3GPP Version 6 single rate	X	X	X	X	X				
3GPP Version 6 multi-rate	X	X	X	X	X				
3GPP2						X			
MP3							X		
MPEG-4 (ISMA profile 0)	X								
RealMedia								X	

4.2. File Formats Used with Video Codecs

The following table summarizes the file formats that Helix Mobile Producer can use for the various video codecs it supports.

File Format	MPEG-4 Simple Profile	H.263	H.264	RealVideo
3GPP Version 5	X	X		
3GPP Version 6 single rate	X	X	X	
3GPP Version 6 multi-rate	X	X	X	
3GPP2	X			
MPEG-4 (ISMA profile 0)	X			
RealMedia				X

5. Uncompressed and Older Formats

The following table summarizes uncompressed and older audio formats that Helix Mobile Server can stream. These are considered legacy formats that are not recommended for streaming, either because of their large bandwidth requirements or because newer compression technologies are more effective.

Format	File Container	Type
a-Law	WAV (.wav)	Companding audio algorithm
AIFF	AIFF (.aiff)	Apple Computer uncompressed audio
AU	AU (.au)	Sun Microsystems uncompressed audio
AVI	AVI (.avi)	Microsoft uncompressed video
Indeo	AVI (.avi)	Intel video codec
μ-Law	WAV (.wav)	Companding audio algorithm
PCM	AVI (.avi) or WAV (.wav)	Pulse code modulation for audio or video
WAV	WAV (.wav)	Microsoft uncompressed audio